Comparison of morphokinetic markers which predict blastocyst formation and implantation potential from two large clinical datasets

Study question: To demonstrate whether the morphokinetic markers used for embryo selection have a similar relationship to blastocyst formation and implantation in two large clinical datasets.

Summary answer: Morphokinetic intervals for early cleavages were differently distributed between clinics. 2/3 morphokinetic markers in WCM and one in IVI data set were informative for implantation.

What is known already: The ability to correctly select the best embryo for transfer is a highly desirable capability as implantation is the ultimate goal of a successful IVF treatment. Time-lapse technology has assisted in determining whether key embryological events and temporal hallmarks are associated with embryo development or clinical outcome. Nevertheless, not all published algorithms based on morphokinetic markers has been found to be applicable in all clinic. The establishment of key developmental hallmarks in large datasets would demonstrate whether the published algorithms could be universally applied.

Study design, size, duration: Retrospective cohort study on two datasets of embryos cultured until the blastocyst stage (BL) (n = 27316) and/or implanted following single embryo transfers (I) (n = 816).

Participants/materials, setting, methods: Embryos in both clinics were cultured in a time-lapse system (EmbryoScope, Vitrolife, Sweden); IVI-Valencia (BL=11,414, I= 479) and Weill Cornell Medicine (WMC) (BL=15,902; I=337).

Variables studied included: t2, t3, t4, up to t9 as well as the transition among all described cleavages. Two different datasets were compared using quartile plots with 95% CI on the quartile limit and the quartile average value, as well as AUC of the parameter against the relevant outcome.

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i103 Main results and the role of chance: A detailed graphical analysis was performed for t3, t5, cc2 (t3-t2) and the ratio (t5-t3)/(t5-t2). In relation with our best defined marker (t5), timings were not affected between clinics. However, WCM proportions were significantly affected by the definition of achieving BL vs. not achieving BL, when compared to IVI data. A significant decrease in the proportion of blastocysts with longer times to t5 was observed for WCM. Meanwhile, t5 were more informative in the IVI data set in relation to implantation. Similar results were observed in cc2 and the ratio (t5-t3)/(t5-t2). Although similar, t3 timings were significantly higher in IVI data than WCM for the proportion of implanted embryos in the 2nd quartile (within the confidence interval).

Limitations, reasons for caution: Although validated throughout a large datasets of two experienced time-lapse user clinics, the retrospective nature of the analysis is less than ideal.

Wider implications of the findings: These embryo selection algorithms may be suitable among two different and independent large datasets. The parameters are sensitive to the specific attributes of the data, and should not be universally applied. Evaluation of the outcomes depends on parameters used and should be evaluated before the incorporation of any selection algorithms.

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